Claims:

1. A non-contact electrical energy transfer system, comprising:

a ferromagnetic material formed into a nearly continuous loop wherein a gap is formed between two opposing surfaces of said ferromagnetic material;

a first electric conductor coiled about a portion of said ferromagnetic material formed into said nearly continuous loop, said portion opposing said gap;

a block of said ferromagnetic material sized to loosely fit in said gap while being spaced apart from each of said opposing surfaces;

a second electric conductor coiled about a portion of said block, wherein electrical energy applied to said first electric conductor induces an electric current in said second electric conductor when said block is positioned in said gap; and

means for keeping said block spaced apart from said opposing surfaces when said block is fitted in said gap.

2. A non-contact electrical energy transfer system as in claim 1 wherein said means for keeping is a sleeve positioned in said gap.

3. A non-contact electrical energy transfer system as in claim 1 wherein said means for keeping is an electrically insulating material interposed between each of said opposing surfaces and said block.

4. A non-contact electrical energy transfer system as in claim 3 wherein said electrically insulating material is selected from the group consisting of rubber, nylon, plastic and glass.

5. A non-contact electrical energy transfer system as in claim 1 wherein said ferromagnetic material is iron.

6. A non-contact electrical energy transfer system as in claim 1 further comprising a vehicle on which said ferromagnetic material formed into said nearly continuous loop is mounted such that said gap is accessible from a position outside of said vehicle, said vehicle having an AC power source coupled to said first electric conductor for applying said electrical energy thereto.

7. A non-contact electrical energy transfer system as in claim 6 wherein said vehicle is a submersible vehicle.

8. A non-contact electrical energy transfer system as in claim 7 further comprising an underwater vehicle on which said block is mounted.

9. A non-contact electrical energy transfer system as in claim 8 further comprising means mounted onboard said underwater vehicle and coupled to said second electric conductor for receiving said electric current so-induced therein.

10. A non-contact electrical energy transfer system, comprising:

a C-shaped core of a ferromagnetic material having two opposing end faces with a gap defined therebetween;

a first electric conductor coiled about a portion of said C-shaped core that opposes said gap;

a block of said ferromagnetic material sized to loosely fit in said gap while being spaced apart from each of said opposing end faces;

a second electric conductor coiled about at least a portion of said block, wherein electrical energy applied to said first electric conductor induces an electric current in said second electric conductor when said block is positioned in said gap; and

electrically insulating material disposed in said gap to keep said block spaced apart from each of said opposing end faces when said block is fitted in said gap.

11. A non-contact electrical energy transfer system as in claim 10 wherein each of said opposing end faces of said C-shaped core is covered with said electrically insulating material.

12. A non-contact electrical energy transfer system as in claim 10 wherein said electrically insulating material is selected from the group consisting of rubber, nylon, plastic and glass.

13. A non-contact electrical energy transfer system as in claim 10 wherein said ferromagnetic material is iron.

14. A non-contact electrical energy transfer system as in claim 10 further comprising a vehicle on which said C-shaped core is mounted such that said gap is accessible from a position outside of said vehicle, said vehicle having an AC power source coupled to said first electric conductor for applying said electrical energy thereto.

15. A non-contact electrical energy transfer system as in claim 14 wherein said vehicle is a submersible vehicle.

16. A non-contact electrical energy transfer system as in claim 15 further comprising an underwater vehicle on which said block is mounted.

17. A non-contact electrical energy transfer system as in claim 16 further comprising an electrical load mounted onboard said underwater vehicle and coupled to said second electric conductor.

18. A non-contact method of transferring electrical energy, said method comprising the steps of;

providing a ferromagnetic material formed into a nearly continuous loop wherein a gap is defined therein with two opposing surfaces of said ferromagnetic material defining the ends of said gap, said ferromagnetic material having a first electric conductor coiled thereabout at a region thereof that opposes said gap;

providing a block of said ferromagnetic material sized to loosely fit in said gap while being spaced apart from each of said opposing surfaces, said block having a second electric conductor coiled thereabout;

inserting said block with said second electric conductor coiled thereabout into said gap while keeping said block spaced apart from each of said opposing surfaces; and

applying electrical energy to said first electric conductor when said block is in said gap, wherein an electric current is induced in said second electric conductor.

19. A method according to claim 18 wherein said electrical energy so-applied is an AC voltage.

20. A method according to claim 18 wherein said step of inserting occurs with said gap and said block being submerged in water, said method further comprising the step of electrically insulating each of said opposing surfaces from said block.